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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/602,468
Filing Date: June 23, 2003
Appellant(s): SELVAMANICKAM ET AL.

David A. Schell
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 9/15/08 appealing from the Office action mailed 4/15/08.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

2005/0173679	Mannhart et al.	8-2005

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 23-34 and 36-43 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mannhart et al. (US Patent Application Publication No. 2005/0173679).

Mannhart et al. teach a superconductive article comprising a Ni-alloy substrate tape overlayed with a plurality of individually identifiable superconductive films disposed one atop another (paragraph [0041]) and in direct contact with each other free of intervening layers (Figure 5 and Example 1). These layers may be applied by any of a number of techniques, including MOCVD which is the same method taught by Appellant and thus results in atomic bonding between the layers as claimed (paragraph [0041]).

Mannhart et al. do not specifically teach the claimed multiples of at least three (claims 23 and 43) or four (claim 36) layers.

Regarding claims 23, 36 and 43, the superconductor films may be applied as multilayers free of intervening layers (paragraph [0041] and Figure 5). *More particularly, multilayers of the superconductive material applied to a single substrate tape are clearly taught (paragraph [0041]).* These layers may be applied by any of a number of techniques, including MOCVD which is the same method taught by Appellant and thus results in atomic bonding between the layers as claimed (paragraph [0041]). "Multilayers" of the superconductive material as described in paragraph [0041] is considered to include 3 or 4 layers as claimed. Further, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the number of layers for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). More particularly, as the thickness of the superconductive layers affects its functionality due to a direct correlation in current density available in thinner films versus thicker films, it would be obvious to one of ordinary skill in the art at the time of the claimed invention to select the appropriate number of layers while maintaining functionality and arrive at 3 or more layers as claimed.

Furthermore, *as an alternative interpretation*, two tapes may be applied to each other under pressure to result in two superconductive layers in direct contact with each other (paragraph [0042] and Figure 5). Applied pressure is expected to induce atomic bonding, at the very least van der Waals forces, between the superconductive layers. As noted above, multilayers are taught. An additional layer on either or both of the applied tapes will result in at

least 3 if not 4 superconductive films in direct contact. Moreover, it would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the multiple layers as taught in Figure 5, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. The disclosure of multiple layers by Mannhart et al. provides motivation to do so.

Regarding claims 24 and 25, a substrate comprising a Ni-alloy tape is taught (Example 1).

Regarding claims 26 and 27, substrates made of nickel based alloys or similar materials are taught (paragraph [0010]). Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use steel or Inconel as the particular type of nickel based alloy used to form the substrate, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious engineering choice. *In re Leshin*, 125 USPQ 416.

Regarding claims 28-30, a buffer, such as YSZ, is applied prior to application of the superconductive layers to the substrate (Example 1). The buffer layer may have a bi-axial texture (paragraph [0010]).

Regarding claims 31-34, $ReBa_2Cu_3O_7$ is a suitable rare earth oxide material for the superconductive layers, where Re is a rare earth or Y (paragraph [0041]).

Regarding claims 37-40 and 43, the superconductive layers are a few microns in thickness (paragraph [0010]), usually about 0.5 to 1.5 microns (paragraph [0024]), and each layer may have a different thickness from the other layers (Figure 5). Thus, when multiple layers are combined, the thickness of the resulting superconductive layer falls within the ranges

claimed. Further, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the thickness for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). More particularly, as the thickness of the superconductive layers affects its functionality due to a direct correlation in current density available in thinner films versus thicker films, it would be obvious to one of ordinary skill in the art at the time of the claimed invention to select an appropriate thickness.

Regarding claim 41, as Mannhart et al. use like materials in a like manner as claimed, it would be expected that the superconducting article will have the same characteristics claimed, particularly the current capacity, absence a showing of unexpected results.

Regarding claim 42, the current density exceeds 10^6 A/cm^2 (paragraph [0011]).

Thus the claimed invention as a whole is *prima facie* obvious over the combined teachings of the prior art.

(10) Response to Argument

Regarding the rejection over the Mannhart et al. reference appellant has presented several arguments. These arguments have been fully considered but they are not persuasive.

In particular, Appellant argues Mannhart et al. do not teach multiple superconductive layers atomically bonded absent an intervening bonding layer.

However, the superconductor films may be applied as multilayers free of intervening layers (paragraph [0041] and Figure 5). *More particularly, multilayers of the superconductive material applied to a single substrate tape are clearly taught (paragraph [0041]).* These layers

may be applied by any of a number of techniques, including MOCVD which is the same method taught by Appellant and thus results in atomic bonding between the layers as claimed (paragraph [0041]).

Appellant argues that paragraph [0041] must be read in light of paragraph [0039] and thus the teaching of multilayers of superconductors taught in paragraph [0041] are limited to alternating layers of different compositions. However, the first sentence of paragraph [0041] recites "Like the buffer layers, for the high T_c superconductors a variety of materials, or multilayers may be used" (emphasis added). The use of the terms "or multilayers" after "a variety of materials" clearly differentiates the use of multilayers from the use of alternating compositions. As this differentiation was intentional as evident by the separation by commas and use of the term "or", the intent of Mannhart et al. to teach multilayers of the same composition free of intervening bonds is clear. The argument that this direct reading of the language chosen by Mannhart et al. must be altered in light of paragraph [0039] is unconvincing. In fact, read as a whole, paragraph [0041] broadens the disclosure by providing alternatives for the first embodiment described in paragraph [0039]. Paragraph [0041] provides for multilayers of rare earth semiconductors formed by MOCVD, the same method and materials disclosed by Appellant. As the layers are formed by the same method disclosed by Appellant, they too will be individually identifiable and atomically bonded.

Regarding the number of layers claimed, the range of layers of superconductive material described by the term "multilayers" described in paragraph [0041] is considered to include 3 or 4 layers as claimed. More particularly, paragraph [0041] specifically provides for alternative embodiments wherein the superconductive layers are formed of multilayer films on a substrate

tape. There is no requirement for intermediate layers as suggested. One of ordinary skill in the art at the time of the claimed invention would recognize that paragraph [0041] provides for application of multiple films in direct contact using methods that result in atomic bonding as set forth above. While the number of layers that may be applied as the taught "multilayers" is not specifically identified, it is within the skill of one of ordinary skill in the art to determine the number of layers that may be applied. That is to say, it would have been obvious to one having ordinary skill in the art at the time of the invention to adjust the number of layers for the intended application, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). More particularly, as the thickness of the superconductive layers affects its functionality due to a direct correlation in current density available in thinner films versus thicker films, it would be obvious to one of ordinary skill in the art at the time of the claimed invention to select the appropriate number of layers while maintaining functionality and arrive at 3 or more layers as claimed.

Moreover, Appellant has failed to show a criticality to the claimed number of layers. The original forms of the present independent claims filed 7/20/05 required only a "plurality" of layers. As MOCVD can produce a single layer of a thickness or multiple thin layers which combine to be that same thickness, the difference between these formations is not evident. Nothing on the record provides secondary considerations that would indicate the claimed three (claims 23 and 43) or four (claim 36) layers are preferred over the multilayers taught by Mannhart et al. or over a single thicker layer. As there appears to be no distinction

between the layers of Mannhart et al. and those claimed in boundary function, the number of claimed layers is not deemed critical.

Additionally, Appellant provides "That the films are individually identifiable and atomically bonded is an inherent result of [MOCVD]" in both the present Brief (page 5, lines 14-17) and the Declaration of Dr. Venkat Selvamanickam. Therefore, as Mannhart et al. teach MOCVD is a desirable method for forming the multilayer structures taught (paragraph [0041]) these same structures are expected to individually identifiable and atomically bonded films as an inherent result. That is to say, the use of the same method is expected to produce the same result. If Appellant achieves a different result it must be due to some limitation not currently claimed.

Finally, *with respect to the alternative interpretation of the reference*, Appellant argues Mannhart et al. the superconductive layers in direct contact as disclosed are bonded through mechanical rather than atomic forces as claimed. In addition to the argument set forth above that each individual tape may include multilayers of superconductive material, two tapes formed as disclosed may be applied to each other under pressure to result in two superconductive layers in direct contact with each other (paragraph [0042] and Figure 5). As noted above, multilayers are taught. An additional layer on either or both of the applied tapes will result in at least 3 if not 4 superconductive films in direct contact. Further, it would have been obvious to one having ordinary skill in the art at the time the invention was made to duplicate the multiple layers as taught in Figure 5, since it has been held that mere duplication of essential working parts of a device involves only routine skill in the art. *St. Regis Paper Co. v. Bemis Co.*, 193 USPQ 8. The disclosure of multiple layers by Mannhart et al. provides motivation to do so.

Appellant's argument states that the pressure results in mechanical bonding only. However, applied pressure is expected to induce atomic bonding, at the very least van der Waals forces, between the superconductive layers. Appellant argues Van der Waals forces are weak and generally not strong enough to bond the superconductive layers without the presence of the mechanical bonding. However, this argument is not commensurate with the claims. The presence of Van der Waals forces, as acknowledged by Appellant, provides some level of atomic bonding which is all that is required of the claim. Furthermore, covalent bonding (the sharing of a single pair of electrons) is expected at some level due to the interaction between molecules when mechanically pressed. Electrons on outer orbitals easily transfer between molecules resulting in an ionic bond. The proximity of the layers and interaction due to the mechanical pressure is expected to produce covalent bonds. As such, there are at least two types of atomic bonds present, Van der Waals and covalent bonds, contributing to the bonding of the layers of Mannhart et al. The claims only require that the layers be "atomically bonded". Either of these forms of bonding meet this limitation no matter how weak or strong as the claim does not require any level of bond strength. If Appellant achieves a different result it must be due to some limitation not currently claimed.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Aaron Austin/

Conferees:

/D. Lawrence Tarazano/

Supervisory Patent Examiner, Art Unit 1794

/Jennifer Michener/

QAS, TC1700